Improving Clinical Coding Coverage and Accuracy through Cadre-Specific Training: Evidence from a Federal Tertiary Hospital in Southwest Nigeria

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ABSTRACT

Accurate clinical coding is essential for reimbursement, epidemiological surveillance and health-care planning, yet coding in Nigerian tertiary hospitals is often incomplete and inaccurate owing to inadequate training, backlogs and poor source documentation. This study assessed the effect of a structured training programme for Health Information Management (HIM) Practitioners on the coverage and accuracy of clinical coding. Methods: An interventional, quasi-experimental, one-group pre-test–post-test design was conducted at the Federal Medical Centre, Owo, Ondo State. A structured programme on clinical coding, including detailed instruction in ICD-10 and ICD-11 and a joint inter-professional session with doctors, was delivered in April 2025. Coding was audited in 351 patient folders drawn by simple random sampling from the discharge register in each of two one-year windows (702 folders in total), one year before and one year after the training, using a clinical-coding audit checklist and the WHO ICD as the reference standard. Coverage items were scored dichotomously and accuracy items on a five-point scale; composite scores were compared using an independent-samples t-test at the 0.05 level. Results: Primary-diagnosis coding coverage rose from 59.0% to 90.9% and secondary diagnostic coding from 31.9% to 72.6%. The composite clinical-coding quality score rose from 2.42 (SD = 1.08) to 4.55 (SD = 0.91) out of 5.0 ($t = 28.26$, $df = 700$, $p < 0.001$). The largest gain was in the correspondence between the documented diagnosis and the assigned code, which rose from 2.20 to 4.50. Conclusion: Cadre-specific training significantly improved both coding coverage and accuracy. The exceptional gain in diagnosis–code correspondence, achievable only by training both cadres together, shows that the deficiency is relational and is best addressed through joint inter-professional training supported by institutionalised coding audit.

KEYWORDS

Clinical coding, ICD; coding accuracy, health information management, training intervention, health data quality, Nigeria

I. INTRODUCTION

Clinical coding involves assigning standardised codes to the diagnoses, procedures and other services provided during a patient's hospital stay. These codes are essential for billing, reimbursement, epidemiological research and health-care planning. The accuracy of coding is critical, since errors produce misleading data, financial discrepancies and compromised patient care. Despite this importance, coding errors remain prevalent, often owing to inadequate training, a lack of standardisation and poor source documentation.

In Nigeria, coding quality is a growing concern, particularly in tertiary hospitals that manage complex cases and large patient volumes. Health Information Management (HIM) departments frequently experience substantial backlogs of encoded folders, and the codes that are applied often exhibit low accuracy and poor correspondence with the physician's documented diagnosis. A Nigerian survey found that 60% of respondents reported difficulty with accurate clinical coding attributable to inadequate training and resources. Because HIM Practitioners depend entirely on the narrative provided in physician-authored summaries, coding quality is conditioned both by coder competence and by the quality of the source documentation.

Although well-structured coding training programmes have been shown to improve coding accuracy in high-income countries, those studies were conducted in settings with well-established health systems, and the distinctive challenges of low-resource settings such as Nigeria remain under-researched. This study addressed that gap by evaluating whether a structured training programme for HIM Practitioners, delivered alongside a joint inter-professional session with doctors, improves the coverage and accuracy of clinical coding at a federal tertiary hospital in Southwest Nigeria.

II. MATERIALS AND METHODS

A. Design and setting

An interventional, quasi-experimental, one-group pre-test–post-test design with no control group was conducted at the Federal Medical Centre, Owo (FMC Owo), a federal tertiary referral hospital in Ondo State, Southwest Nigeria (Creswell & Creswell, 2023). Coding quality was assessed at baseline and again after training, permitting a within-group before-and-after comparison.

B. The training intervention

Day Two of the structured two-day programme addressed clinical coding practice and was directed at HIM Practitioners. Content covered the principles of clinical coding and its significance for health-care operations, billing and epidemiology; detailed instruction in ICD-10 and ICD-11 classification, conventions and practical application; and the identification and correction of common coding errors. Delivery methods comprised didactic sessions led by experienced coding practitioners, hands-on coding exercises using de-identified patient records, and group problem-solving.

The day concluded with a joint inter-professional session attended by both doctors and HIM Practitioners, in which the two cadres examined together the downstream consequences of

ambiguous or incomplete documentation for code assignment. This session was included deliberately, because the identified deficiency is relational rather than confined to either cadre in isolation. The training was delivered in April 2025, and a fidelity record confirmed that the full programme was completed without omission.

C. Population, sampling and sample size

The unit of study was the coded patient record rather than the member of staff. The study population comprised the discharge folders generated at FMC Owo, of which approximately 3,996 were discharged within a one-year period. Using Cochran's formula for a single proportion ($Z = 1.96$, $p = 0.5$, $d = 0.05$) with a finite population correction for $N = 3,996$, the required sample was 351 folders per assessment period (702 folders in total). In each period, records were selected by simple random sampling from the hospital discharge and clinical-coding registers using a table of random numbers, so that every eligible record had an equal and independent probability of selection.

D. Assessment periods and instrument

Coding was audited during the one-year pre-intervention period (1 April 2024 to 31 March 2025) and the one-year post-intervention period (1 May 2025 to 30 April 2026). A clinical-coding audit checklist assessed coding coverage and coding accuracy: each coverage item was scored dichotomously as present or absent, and each accuracy item was rated on a five-point scale from 1 (poor) to 5 (excellent). The current WHO ICD (ICD-10, with reference to ICD-11) served as the reference standard against which the accuracy and specificity of the recorded codes were assessed; a code was judged accurate only where it corresponded to the documented diagnosis in accordance with ICD coding rules and conventions. A composite clinical-coding quality score was derived from the item means and proportions.

E. Validity, reliability and ethics

The instrument was subjected to content and face validity review and was pilot tested at a tertiary hospital other than FMC Owo, which did not contribute data to the main analysis. A sub-sample of folders was independently rated by a second assessor to examine inter-rater agreement. Written institutional permission and ethical approval were obtained before data collection; no personal identifiers were extracted, and data were handled in compliance with the Nigeria Data Protection Act (2023) and the National Health Act.

F. Data analysis

Data were analysed using the Statistical Package for the Social Sciences. Descriptive statistics summarised the coverage proportions and accuracy ratings, and an independent-samples t-test compared the pre- and post-intervention composite clinical-coding quality scores at the 0.05 level of significance.

III. RESULT

A. Coding coverage and accuracy

Table 1 presents the coding coverage and accuracy results. Both dimensions improved markedly after the training. Primary-diagnosis coding coverage rose from 59.0% to 90.9%, and secondary diagnostic coding more than doubled, from 31.9% to 72.6%. On the five-point accuracy scale, the composite clinical-coding quality mean rose from 2.42 to 4.55 out of 5.0, with the largest single gain in the correspondence between the documented diagnosis and the assigned code, from 2.20 to 4.50.

Table 1. Clinical coding coverage and accuracy audit (n = 351 folders per period). Coverage items are percentages of folders; accuracy items are means on a five-point scale from 1 (poor) to 5 (excellent). Source: field work, 2025

Coding parameter	Pre-training	Post-training
Primary-diagnosis coding coverage (%)	59.0	90.9
Secondary diagnostic coding coverage (%)	31.9	72.6
Diagnosis–code correspondence (mean, 1–5)	2.20	4.50
Composite clinical-coding quality (mean, 1–5)	2.42	4.55

B. Statistical test

An independent-samples t-test compared the composite clinical-coding quality scores. The pre-intervention mean was 2.42 (SD = 1.08) and the post-intervention mean was 4.55 (SD = 0.91), $t = 28.26$, $df = 700$, $p < 0.001$. Because the p-value is below the 0.05 level of significance, training has a statistically significant positive effect on the quality of clinical coding at FMC Owo.

IV. DISCUSSION

In low-resource settings, backlogs of encoded folders accumulate through workforce shortage, reliance on manual sorting and the absence of dedicated coding staff. The audit data show that coverage rose substantially after training, with primary-diagnosis coding increasing from 59.0% to 90.9% and secondary diagnostic coding from 31.9% to 72.6%, while composite accuracy rose from 2.42 to 4.55 out of 5.0 ($t = 28.26$, $df = 700$, $p < 0.001$). This aligns with Olatunji et al. (2024) and Bello et al. (2022), who found that workflow-management training coupled with systematic batching protocols enables HIM departments to clear backlogs notwithstanding infrastructural constraint, and with Eze et al. (2023) and Adetunji et al. (2023), who stressed that routine ICD training safeguards institutional revenue, protects against insurance-claim denial and prevents statistical distortion in epidemiological tracking.

The most analytically significant result is the improvement in correspondence between the documented diagnosis and the assigned code, which rose from 2.20 to 4.50. Because HIM Practitioners depend entirely on the narrative provided in physician-authored summaries, this parameter could not be improved by training either cadre alone. Its movement is therefore evidence of the synergistic effect of training both cadres, and specifically of the

joint inter-professional session at which the two cadres examined each other's constraints. The marked rise in secondary diagnostic coding reflects a shift from coding the principal condition alone to coding the full clinical profile, which is the basis of usable morbidity data and reliable reimbursement under the National Health Insurance Authority framework.
Several limitations apply. The absence of a control group limits the exclusion of history and maturation effects; the document audit captures only what is recorded; follow-up was one year, so the durability of the gains is unknown; and the single-institution design limits generalizability. Secondary coding remained constrained where the source case note lacked sufficient clinical detail, confirming that coding quality cannot exceed the quality of the documentation it draws upon.

V. CONCLUSION

Cadre-specific training significantly improved both the coverage and the accuracy of clinical coding at a federal tertiary hospital in Southwest Nigeria. The exceptional gain in diagnosis–code correspondence, achievable only by training doctors and HIM Practitioners together, demonstrates that the deficiency in coding quality is relational, residing at the interface between the two cadres. Hospitals should institutionalise periodic coding training for HIM Practitioners that retains the joint inter-professional session, establish a standing coding-audit function, and put in place a documentation-query procedure through which coders may seek clarification of ambiguous entries, so as to sustain the alignment achieved.

REFERENCES

[1] Abubakar, I. R., Mbah, O. E., & Afolabi, O. (2022). Staff training and data management in West African healthcare: challenges and solutions. West African Journal of Medicine, 41(1), 25–32.
[2] Adetunji, A., et al. (2023). ICD training and reimbursement integrity in Nigerian hospitals. Health Policy Review, 15(4), 112–126.
[3] Akinyemi, O., et al. (2022). Perceptions of discharge-summary and coding quality among Nigerian health professionals. Nigerian Journal of Health Informatics, 18(1), 20–29.
[4] Bello, S., et al. (2022). Workflow management in Nigerian health information management departments. African Journal of Health Sciences, 15(2), 140–151.
[5] Creswell, J. W., & Creswell, J. D. (2023). Research design (6th Ed.). SAGE.
[6] Eze, C., et al. (2023). Routine coding training and epidemiological data integrity. Journal of Health Information Management, 37(1), 55–66.
[7] Field, A. (2018). Discovering statistics using IBM SPSS Statistics (5th Ed.). SAGE.
[8] Garcia, M., et al. (2022). Determinants of clinical coding error: a systematic review. International Journal of Medical Informatics, 160, 104708.
[9] Nichols, B., et al. (2023). Standardisation and coding accuracy. BMJ Health & Care Informatics, 30(1), e100701.
[10] Nwokocha, A., et al. (2022). Source documentation and coding quality in Nigerian tertiary hospitals. African Journal of Health Sciences, 15(1), 60–71.
[11] Olatunji, T., et al. (2024). Clearing coding backlogs in resource-constrained settings. Journal of Global Health, 14(1), 1–11.

[12] Pallant, J. (2020). SPSS survival manual (7th Ed.). Open University Press.
[13] Robinson, K., & Curtis, L. (2023). Financial and clinical consequences of coding error. Health Information Management Journal, 52(2), 88–97.
[14] Smith, P., et al. (2021). The role of clinical coding in health systems. International Journal of Medical Informatics, 150, 104455.
[15] World Health Organization. (2022). International statistical classification of diseases and related health problems (ICD). WHO.